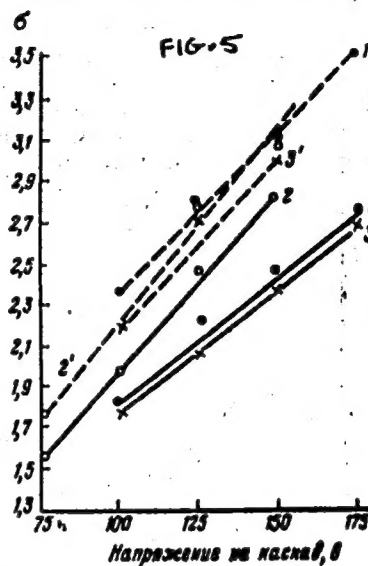
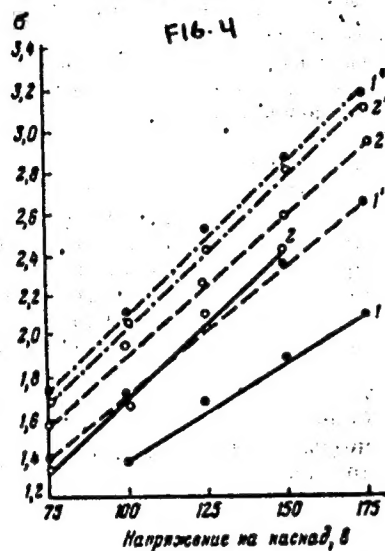


20426  
S/109/60/005/012/024/035  
E192/E582

Simultaneous Activation of Various Photocathodes and Emitters in  
Photo-electron Multipliers



Card 6/6

L 43085-65 EWT(m)/EPA(w)-2/EWA(m)-2 Pab-10/Pt-7 IJP(c) GS  
 ACCESSION NR: AP5007915 S/0000/64/000/000/0086/0089

AUTHOR: Vladimirovskiy, V. V.; Koshkarev, D. G.; Tarasov, Ye. K.

TITLE: 500-Gev proton accelerator

SOURCE: International Conference on High Energy Accelerators. Dubna, 1963.  
 Trudy. Moscow, Atomizdat, 1964, 86-89

TOPIC TAGS: high energy accelerator, injector, synchrotron

ABSTRACT: The present report discusses a third alternative of an injector ring, whose advantage would be the fact that such an accelerator-injector has already been built at Serpukhov; namely, the 70-Gev accelerator of the Institute of Theoretical and Experimental Physics, which has a ring just seven times smaller in length than that of the main accelerator. The 70-Gev accelerator can operate both as an independent device producing a proton beam with an energy of 70 Gev and also as an injector with an energy of 15 Gev per cycle. Provision would be made for the use of multi-turn injection on the Serpukhov accelerator to increase the intensity. (The first alternative was an auxiliary proton synchrotron with an energy of 15 Gev, proposed in 1959 by Sandsom. The second alternative was a long injector which

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ACCESSION NR: AP5007915

6

has a ring equal in length to the main accelerator and is placed in the same ring chamber.) The report presents the main parameters of the 500-Gev accelerator and the arrangement of its magnets and the correcting elements. Serpukhov possesses, it is noted, enough space for an accelerator even larger than the 70-Gev, which would become its injector. The comparatively long acceleration time of 6 seconds in the parameter list is due to the properties of the injector, in which the energy distribution of the accelerated particles is rather large. Acceleration time would decrease at higher radio-frequencies. "The authors take this opportunity to express their thanks to F. A. Vodop'yanov (RAI AN SSSR) for his very valuable ideas in the field of high-frequency accelerating systems, to L. L. Gol'din for his active participation in the selection of the parameters of the preliminary alternative of the accelerator, and to the computer specialists O. N. Vasil'yeva, T. K. Stadnikova, and N. I. Cherepova for carrying out the large quantity of numerical computations." Orig. has 2 figures, 1 table.

ASSOCIATION: Institut teoreticheskoy i eksperimental'noy fiziki GKAE SSSR  
(Institute of Theoretical and Experimental Physics, GKAE SSSR)

Card 2/3

SUBMITTED: 26 MAY 68

TARASOVA, Ye.M. [deceased]; TULUPOV, V.A.

Reduction of acetylcyclohexane by the Kishner reaction. Zhur.ob.  
khim. 31 no.6:1936-1941 Je '61. (MIRA 14:6)

1. Moskovskiy gosudarstvennyy universitet i Vsesoyuznyy zaochnyy  
mashinostroitel'nyy institut.  
(Cyclohexane)

TARASOVA, Ye. M.

Colloids

Kinetics of the thixotropic formation of the structure of suspensions of Oglanlinskiy bentonite. Dzhardanakskiy clay and mixtures of the two. Izv. Turk. fil. AN S.S.R. No. 1, 1951.

9. Monthly List of Russian Accessions, Library of Congress, June 1953, Uncl.

TARASOVA, YE. M.

TARASOVA, YE. M., and MURAV'YEVA, M. YA.

"Composition and Properties of Clays and Argillaceous Soils (Loams)  
From Certain Deposits in Western Turkmenistan", Izv. AN Turkmen SSR, No 1,  
73-80, 1954.

The authors investigate six assays of clays which are now being  
utilized in the production of brick in the region of Tashauz and  
Kazandzhik (Nebit-Dag). The most important properties are presented  
in a table. All the clays are strongly salted, especially the Nebit-  
Dag clays; during firing, however, the salting quality decreases in  
consequence of the sublimation of the salts. (RZhGeol, No 5, 1954).  
SO: Sum. No. 443, 5 Apr. 55

TARASOVA, Ye. M., and Murav'yeva, M. Ya.

"The influence of Salts on the Water Resistance of Clays and Loams of Turkmenistan"

Izv. AN TurkSSR No 3, 1954, 58-62

The authors present results of experiments, conducted with natural clays and loams, which established that the addition of soluble sulfates, chlorides, and their mixtures lowers the water resistance of brick clay 30-60%. The water resistance of brick clay can be increased 200-300% by adding hydrophobic substances. (RZhMekh, No 7, 1955)

SO: Sum-No 787, 12 Jan 56

PARAS'VA, Ye. M., and V. PAV'YUKA, M. Ye.

"Influence of additions of salts Upon the Cohesion of the raw Material and Upon Mechanical Strength of Ceramic Made from the Clays and Loams of Turkmenistan," Izv. AN Turkm. SSR, no 4, pp 67-71, 1954

The authors present results of tests on the addition of salts to loams (soil containing sand and 25-50% clay) from the open pits of the Bayram-Ali and Badi plants, with the aim of clarifying the dependence of the mechanical strength upon the qualitative and quantitative composition of the salts in ceramic and in the raw material. Sodium chloride added to clay or loam in the amount 1.2% lowers the cohesion of the raw material. Maximum drop in cohesion to 33% occurs for additions of 2% of sodium chloride. Salts of calcium, sodium, and magnesium in the amount of 2.5% increase the cohesion of the raw material; natural viterite does not change the cohesion of the raw material; barium chloride does not lower it. (RazGeol, No 4, 1955)

Sum. No. 481, 7 Oct 55



TARASOVA, Ye.M.; GORBESHKO, R.P.

Saving Portland cement in making mortars and concretes based on  
local aggregates and fine-grained sands. Trudy Inst. antiseism.  
stroi. AN Turk. SSR 3:112-131 '58. (MIRA 13:10)  
(Turkmenistan--Concrete) (Aggregates (Building materials))

TARASOVA, Ye.M.; GORBESHKO, R.P.

Behavior of brick masonry in the dry hot climate of the Turkmen  
S.S.R. Trudy Inst. antiseism. stroi. AN Turk. SSR 3:140-144 '58.  
(Turkmenistan--Bricks--Testing) (MIRA 13:10)

TARASOVA, Ye.M.; KOVALENKO, A.F.

Using soil cement mixes in rural construction. Trudy Inst. antiseism.  
stroi. AN Turk. SSR 3:170-205 '58. (MIRA 13:10)  
(Soil cement) (Turkmenistan--Building)

TARASOVA, Ye.M.

Plastering of masonry work containing salt. Trudy Inst. antiseism.  
stroi. AN Turk. SSR 3:206-220 '58. (MIRA 13:10)  
(Asia, Central--Plastering)

TARASOVA, Yo.M.; KERBABAYEVA, E.A.

Selection of the composition of concretes made of Turkmen materials  
in which fine sands are used. Trudy Inst. antiseism. stroi. AN Turk.  
SSR no.2:66-72 '58. (MIRA 17:6)

TARASOVA, Ye.M.; GORBESHKO, R.P.; KERBabayeva, E.A.

Saving portland cement in mortars and concretes made of nonstandard  
Turkmen fillers using active finely-milled additives. Trudy Inst.  
antiseism. stroi. AN Turk. SSR no.2:73-78 '58 (MIRA 17:6)

TARASOVA, Ye.M.; MURAV'YEVA, M.Ya.; TARNIZHEVSKAYA, T.M.

Corrosion of concrete made of Bezmeis portland cement and of local  
Turkmen fillers in sulfate and magnesian aggressive media. Trudy  
Inst. antiseism. stroi. AN Turk. SSR no.2:90-107 '58.  
(MIRA 17:6)

TARASOVA, Ye.M.

Selecting the quality of mortar for plastering of saline masonry.  
Trudy Inst. antiseism. stroi. AN Turk. SSR no.2:108-111 '58.

Determining by chemical analysis the suitability of clays and  
loams of Tataria for the manufacture of air-resistant brick.  
Trudy Inst. antiseism. stroi. AN Turk. SSR no.2:112-114 '58.  
(MIRA 17:6)



TABASOVA, Ye.M.

Possibilities for obtaining local binders based on clays and clayey  
soils of the Turkmen S.S.R. Trudy Inst. antiseism. stroi. AN Turk.  
SSR 3:221-226 '58. (MIRA 13:10)

(Turkmenistan--Binding materials)

TARASOVA, Ye.M.

Heat-insulating material based on loesslike clayey soils of Turkmenia.  
Trudy Inst. antiseism. stroi. AN Turk. SSR 3:227-230 '58.

(MIRA 13:10)

--(Insulation (Heat))

*Tarasova Ye. N.*  
SARATIKOV, A.S.; TARASOVA, Ye.N.; KHOMYAKOVA, A.F.

Synergism of camphor and adrenalin [with summary in English]. Farm.  
1 toks. 20 no.5:84-90 S-O '57. (MIRA 10:12)

1. Kafedra tekhnologii lekarstvennykh form i farmakologii farma-  
tshevicheskogo fakul'teta (zav. - prof. A.S.Saratikov) Tomskogo  
meditsinskogo instituta.

(EPINEPHRINE, effects,

synergistic action of camphor (Rus))

(CAMPHOR, EFFECTS,

synergistic action of epinephrine (Rus))

J. 12687-63 EWP(j)/EWP(q)/EWT(m)/BDS APFTC/ASD PC-4 RM/JD  
 ACCESSION NR: AP3001598 3/0138/63/000/005/0049/0051

AUTHOR: Korchagin, Yu. M.; Savos'kina, V. P.; Tarasova, Ye. S.

TITLE: A new phenol adsorption method for determining the adsorption surface of carbon black

SOURCE: Kauchuk i rezina, <sup>22</sup>no. 5, 1963, 49-51

TOPIC TAGS: carbon black, adsorption, adsorption surface, roughness, phenol adsorption

ABSTRACT: In view of the coarseness of furnace carbon black and its unsatisfactory performance as reinforcing filler in tires, it is important to know the exact coefficient of coarseness (the ratio of its adsorption surface to the geometrical surface). The authors present a simple new test for the determination of the adsorption surface of furnace carbon black PM-70. This test was recommended by the Laboratory of the Scientific Research Institute of the Tire Industry, which adopted it at their carbon black plant after a thorough check. The method is based on the determination of the amount of phenol adsorbed by a weighed sample of carbon black from an aqueous phenol solution

Card 1/2

L 12687-63  
ASSOCIATION NR: AP3001598

of known concentration, measured by interferometer. The authors added another simplification to the procedure of determining the true adsorption surface of furnace carbon black by replacing the tedious heating of 700C in a nitrogen current by an experimentally established coefficient which permits the calculation of the degassed surface of carbon black from its original one. Orig. art. has: 1 chart and 2 tables.

ASSOCIATION: Barnaul'skiy sazhevy\* zavod (Barnaul Carbon Black Plant)

SUBMITTED: 00

DATE ACQ: 08Jul63

ENCL: 00

SUB CODE: 00

NO REF SOV: 000

OTHER: 000

Card 2/2

TARASOVA, Yuliya Andreyevna

[Circulation and turnover of capital] Krugoborot i oborot kapitala. Moskva, Vysshaya shkola, 1960. 79 p. (MIRA 14:9)  
(Capital)

Structural changes in rubber by the action of molecular oxygen. II. Kinetics of the destructive solution of vulcanized rubber. B. Dugalkin and L. Tarasova (M. V. Lomonosov Inst. Pure Chem. Technol., Moscow). *J. Gen. Chem. (U.S.S.R.)* 17, 1401 14(1947) (in Russian) *Chem. Abstr.* 40, 10855; *Russk. Khim. Obshch.* 73, 1121; *C.A.* 35, 3121; 40, 10855; *Byull. Khim. Obshch.* 73, 1121; *Mendeleev*, 1945. — Proof was sought and obtained of the indispensability of O for soln. of vulcanized rubber and, consequently, of the main-valence nature of vulcanization, as opposed to the intermol. forces theory advocated by Williams (*C.A.* 32, 3210) on the basis of his peptization expts. A mixt. of smoked sheet 100 S 2, tetramethylthiuram disulfide 0.2, ZnO 1, and stearic acid 1, was vulcanized at 141° ± 0.5° (optimum in 20 min.) with the characteristics: CHCl<sub>3</sub> ext. 8%, Me<sub>2</sub>CO ext. 3.8%, combined S 1.65%, tensile strength 100-200 kg./sq. cm., elongation 300%. Vulcanization was carried out on thin layers coated (in a free Cl<sub>2</sub> soln.) on the outer surface of a cylindrical glass ampul, in the absence of O (CO<sub>2</sub> atm.); the vulcanized product was then extruded with cold CHCl<sub>3</sub> in the dark and in a current of pure N for 10 hrs., and the ampul carrying the film was immersed in a thermostated closed vessel filled with xylene and equipped with a reflux condenser to prevent losses of solvent by the stream of gas bubbled through the vessel at a const. rate. Progress of the soln. was observed by microbalance weighings of ampul and film. With O rigorously excluded in current of N, only 2.8% of the wt. of the film was dissolved in 16 hrs. at 102.5°. That, contrary to Williams, peptization does not take place in the absence of O was demonstrated in expts. with 0.01 g. of vulcanizate, heated sealed tubes at 141°, 72 hrs., in the presence of 10 cc. N-satd. xylene, and 0.2 g. of Na oleate, 0.04 g. of piperidine, or 0.04 g. of the condensation product butyraldehyde with aniline; no evidence of peptization was

observed either on heating or on 1 year's standing. In sharp contrast to this, the film did dissolve in xylene at 102.5° in a current of O; the relative rate of soln.  $r$ , the percentage  $r$  of rubber dissolved relative to the initial wt. of the film, is the slower the greater the initial thickness  $d_0$  of the film, complete soln. being reached in from 100 to 250 min. with  $d_0$  from 0.08 to 0.25 mm. For each given  $d_0$ , the curve of  $r$  against time is linear up to about  $r = 50\%$ , then deflects and becomes increasingly steeper. Obviously, the const.-velocity portion corresponds to the

stage of const. accessible surface area, while the acceleration indicates progressive disintegration and lifting from the glass wall. Correspondingly, while the  $r$  curves fan out from a common origin at 0, the plot of the abs. rate of soln.  $v$  (g. rubber dissolved) involves one common rectilinear portion for all  $d_0$ , the curves branching out only at the disintegration stage. Assuming the combination of O at the surface to be the rate-dtg. step, at const. concn. of O,  $v = k_1 s$  ( $s$  = surface area) and  $v = k_2 d_0 / d_1 d_2$  (where  $d$  = thickness of surface layer dissolved per unit time,  $d = d_0$  of the vulcanizate), or  $rd_0 = kd_0 = \text{const.}$ ; this is confirmed by the exptl. data, e.g.,  $d_0 = 0.08, 0.135, 0.173, 0.233$  mm.,  $r = 61.6, 37, 32, 22\%$  per min.; under O at 750 mm. Hg. at 102.5°,  $d = 8.9 \times 10^{-3}$  cm./sec.;  $v = 3.4 \times 10^{-3}$  g./sq. cm./sec. In terms of the partial pressure  $p$  of O,  $v$  (in the const.-rate range) increases linearly with  $p$  up to about  $p = 400$  mm. Hg., whereafter the increase of  $v$  with further increasing  $p$  (up to 700) becomes gradually slower;  $p = 22.4, 187.0, 400.0, 565.0, 700.0$ ,  $10^3 v = 0.31, 1.65, 2.73, 3.20, 3.44$ . The dependence can be expressed by  $v = k' p / (1 + p)$ , assuming  $v$  to be proportional to the no. of points occupied by O, equal to  $p / (1 + p)$  by a derivation analogous to

**Structural changes in rubber produced by molecular oxygen. III. Properties of the destructively dissolved vulcanizate of natural rubber.** B. Dogadkin, Z. Tata-sova, and A. Pasyanski (M. V. Lomonosov Inst. Fine Chem. Technol., Moscow). *J. Gen. Chem. (U.S.S.R.)* 17, 2222-8 (1947) (in Russian); *cf. C.A.* 42, 2798.

**2801f.** On standing, the light yellow, opalescent product of the destructively acid dissolved vulcanizate pptd. ZnO; from the supernatant clear soln.,  $\text{Me}_2\text{CO}$  seps about 70% of the product in the form of a sticky mass which, after drying in vacuo at 20°, is sol. in the usual rubber solvents; its content of combined S is 1.98%, i.e., the same as in the original vulcanizate; the O content is 50 mg./g., of which 3.77 mg. is free carboxyl (1); hence, for each carboxyl, there is a hydrocarbon residue of mol. wt. of about 8000. Owing to the high content of carboxyl groups and the low mol. wt., the product is sol. in binary solvents involving assoc. liquids (e.g.,  $\text{C}_6\text{H}_6$  +  $\text{EtOH}$ ). Specific viscosity  $\eta$ , at concns.  $c$  up to 0.5%, is a linear function of  $c$ ; the const.  $k = \eta/c$  ( $v = \text{sp. vol.}$ ) depends on the depth of the destruction; for the product pptd with  $\text{Me}_2\text{CO}$  in soln. in  $\text{CCl}_4$ ,  $k = 48$  at 20°. This gives, according to the formula of Mehl, *et al.* (*C.I.* 34, 7307\*), for the ratio of the area of the ellipsoidal particles,  $b/a = 24$ , in contrast to 117-123 calcd. in the same way for the sol. fraction of natural rubber, and about 100 for plas-

tized butadiene styrene copolymer (from flow birefringence detns.); consequently, particles of the destructively dissolved vulcanizate are different from those of nonvulcanized rubber. Scattering of light is a linear function of  $c$ , in contrast to crude rubber. From photographic measurements of the diffusion coeff.  $D$  of soln. in  $\text{CCl}_4$ , the mol. wt.  $M$  was calcd. by the equation of Polson (*C.I.* 33, 2844\*)  $M = k/D^{1/2}$ , where for the given solvent,  $k = 2.70 \times 10^{-16}$  (at 20°), and the asymmetry factor  $f$  is taken = 2.15; with the exptl.  $D = 8.84 \times 10^{-7}$  sq. cm./sec.,  $M = 3000$ . On the other hand, from the max. ordinate of the diffusion curve,  $D = 6.62 \times 10^{-7}$ , the discrepancy indicates polydispersity of the product. By the values of  $b/a$  and av.  $M$  it can be estd., as a first approximation, that the particles consist on the av. of 4-5 linked chains of 10-12 isopentene groups each if it is assumed that such particles are massive fragments of the spatial structure of the vulcanizate. Films obtained by dissolving the  $\text{Me}_2\text{CO}$  pptd. product in  $\text{C}_6\text{H}_6$  and evapg. the solvent had tensile strength of 7.2-7.5 kg. per sq. cm. and elongation of 250%, in contrast to 100-200 and 600 for the original vulcanizate. This conflicts with the assertion of Williams (*C.I.* 32, 8210\*) that the strength of vulcanized films is almost the same before and after peptization. N. Flou-



TARASOVA, Z.

Jun 47

USSR/Chemistry - Rubber, Vulcanizing  
Chemistry - Rubber, Reclaiming

"Destructive Dissolving of Vulcanized Rubber," B. Dogadkin, Z. Tarasova, A. Pasynskiy,  
Moscow Inst Fine Chem Tech, 4 pp

"Dok Akad Nauk SSSR, Nova Ser" Vol **LVI**, No 7

Asserts that vulcanization should be considered process in which main feature is formation of spatial structure for molecular chains, connected in operation of vulcanizing agent by forces of main valences. Describes process of destructive dissolving of rubber, undoubtedly of great importance in technical processes of refurbishing rubber by dissolving method. Illustrated with graphs.

PA 60T12

CA

... Solubility of oxygen in some organic liquids. M. Remnikovskii, Z. Tarasova, and B. Dogaikhin (Moskov. Inst. Tekhnol. Khim. Tekhnol. im. M. B. Lomonosova). Zhur. Obshch. Khim. (J. Gen. Chem.) 20, 63-7 (1950). The following solubilities were detd. under atm. pressure. In ml. O<sub>2</sub>/ml. solvent: in tech. xylene (fraction b, 131-140°) 0.177 (at 23°); toluene, 0.126 (20°); ligroin (fraction 110-20°) 0.166 (20°); white spirit (fraction 165-200°) 0.170 (19°); cracking gasoline (fraction 115-50°) 0.178 (19°). In the tech. xylene, at 23, 50, and 100°, sol. 0.177, 0.226, and 0.264 ml. O<sub>2</sub>/ml. solvent and the absorption coeff. (ml. O<sub>2</sub> (S.T.P.)/ml. solvent) = 0.102, 0.170, and 0.102, resp. The pos. temp. coeff. is accounted for thermodynamically by the work spent in the isothermal compression of the gaseous vol.  $v_g$  to its vol. in the soln.,  $v_l$ , approx. equal to the vol. of the solvent. This gives  $\Delta H \sim RT \ln v_l/v_g = RT \ln L$ , where  $L = v_g/v_l$ . In ml./ml., and  $\Delta H = RT (\ln L + 1)$ ; hence  $\Delta H = 1$  at  $L \sim 0.37$ , i.e., the temp. coeff. of the soln. is pos. at solubilities below 0.37 ml./ml., neg. at solubilities greater than 0.37. N. Thon

C.A.

**Destructive solution of vulcanized synthetic rubbers.**  
 B. A. Dogadkin and Z. Tarasova. XI, V. Leningradsk. Inst. Fine Chem. Technol., *Doklady Akad. Nauk S.S.S.R.*, 73, 701-4 (1950). — The rate of soln. in xylene at  $110^\circ$  in O, under a pressure of 760 mm. Hg, increases in the order: Butyl (I) < N-butadiene polymer (II) < natural styrene copolymer (III) < polychloroprene (IV) < natural rubber (V). This order corresponds to the contents of double bonds in the main chains of the polymers, with the added showing-down effect of electrophilic groups in the molts; it is owing to this latter effect that IV dissolves more slowly than V. Double bonds in the side chains have no effect on the rate of soln., rather, interaction between O and side-chain vinyl groups leads to structure formation, i.e., the reverse of destructive dissoln. (in the basis of espits, with butadiene rubbers differing in the proportion of double bonds (in the main chains) of the 1-4 type: 50, 54, and 43%; relative to natural rubber taken as 100%), the rate of destructive soln. increases linearly with that proportion. The straight line does not pass through the origin; this indicates that double bonds of the 1-3 type are involved in the reverse process of structure formation. At const. O pressure, the rate of soln.  $V = k_1 c - k_2 (1 - c) = -k_2 + (k_1 + k_2)c$ , where  $c$  is the concn. of double bonds of the 1-4 type, 2 opposing processes:  $k_1 = k_1' c - k_2' (1 - c) = -k_2' + (k_1' + k_2')c$ , where  $c$  is the concn. of double bonds of the 1-4 type, 1-3 type. For vulcanizates const. tetramethylthiuram disulfide as accelerator, under 760 mm. Hg of O, at  $120^\circ$ , and provided the surface area of the vulcanizate remains const.,  $V$  (in g. wt. cm./min.) =  $-4 \times 10^{-4} + 1.2 \times 10^{-4} c$ , where  $c$  is expressed in % of the total double bonds of the polymer. This relation makes it possible to det.  $c$  from the observed  $V$ . In terms of the surface area  $S$  and the O concn., the rate of soln. is  $k[O]_0 S$ ; the soly. of O in xylene in the temp. range 25-110° is given by  $150.5 + 0.265 t$ . With this expression for  $[O]$ , the activation energies of soln. from the linear plots of  $\log k$  against  $1/T$ , are detd. as II 31.3 (100-120°), III 27.2, and V 19 kcal./mole (97-110°). The high activation energies of II and of III when compared with V are due to vinyl-group side chains. The destructively dissolved vulcanizate II forms a yellowish opalescent soln., from which MeOH dips, about 70% of the substance; the ppt. dried in vacuo at  $30^\circ$  is a crystalline substance, which crystallizes in xylene. The particle content of 3.4 mg./g., by cryoscope in CCl<sub>4</sub>, the particle wt. is 3900-2400, and increases with decrease in concn. The  $\eta_{sp}$  versus  $c$  is 24 dl./g., where  $\eta_{sp}$  is sp. vis. of the vulcanizate and  $c$  its concn. in g./l. The numerical 15, compared with 65 for crude N-butadiene elastomer. The fact that this  $\eta_{sp}$  is about 10 times greater than the  $\eta_{sp}$  of the elastomer indicates that, as a result of swelling, the effective vol. of the particles of the destructively dissolved vulcanizate is about 10 times greater than in the solid state.

Card 1 of 2

USSR/Chemistry - Rubber, Synthetic

Jun 52

"Structural Changes in Rubber Caused by the Action of Molecular Oxygen. V. Destructive Solution of Vulcanized Synthetic Rubber," Z. Tarasova, B. Dogadkin

"Zhur Obshch Khim" Vol XXII, No 6, pp 935-945

Vulcanized synthetic rubbers, when heated in hydrocarbon media containing molecular oxygen, completely go into solution. The kinetics of destructive solution of vulcanized synthetic rubbers conforms to the same laws as that of natural rubber. The rate of destructive solution depends on the molecular structure of the rubber. In ascending order, the rate of destructive solution is:

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USSR/Chemistry - Rubber, Synthetic (Contd 1) Jun 52

butyl rubber ← sodium-butadiene ← butadiene-styrene  
← chloroprene ← natural rubber. The apparent energy of activation for natural rubber is 19 kcal/mol, for sodium-butadiene 31.2 kcal/mol, for butadiene-styrene 27.1 kcal/mol. The rate of destructive solution of butadiene rubber is in a linear relation to the content of structure of type 1,4 (ratio between double bonds in main and branch chains) in the rubber molecule. The mechanical property of vulcanizates have no appreciable effect on the rate of destructive solution. The accelerators used are of great importance, and their effect corresponds to their action on the rate of oxygen addition. Water, by retarding the addition of oxygen, retards the solution of vulcanizates from natural

218716

TARASOVA, Z.

Card 2 of 2

TARASOVA, Z.

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USSR/Chemistry - Rubber, Synthetic (Contd 2) Jun 52

and sodium-butadiene rubber. The rate of destructive soln of vulcanizates in various solvents is in linear relation to the coeff of absorption of oxygen in the solvent. The viscosity of solns of destroyed vulcanized sodium-butadiene rubber is linearly dependent on the concn up to 5%. The av mol wt of particles, detd cryoscopically for sodium-butadiene vulcanizate is 2,400 to 3,600, osmotically 16,000. The axis ratio is 1:15. It is suggested that solns of destroyed vulcanizates are a special type of colloidal solns.

218716

PA 239T22

USSR/Chemistry - Rubber Vulcanizers  
Accelerators

Aug 52

"Thermal Decomposition of Vulcanized Structures of Deformed Vulcanizers Containing Different Accelerators," B. Dogadkin and Z. Tarasova, Sci Res Inst of Tire Production

"DAM SSSR" Vol 85, No 5. pp 1069-1072

The thermal stability of vulcanized rubber will depend on what type of bond prevails in its mol. In S-vulcanized rubber, there are four possible types of bonds, i.e., C - C, C - S - C, C - S - C, and C - S<sub>n</sub> - among natural and butadiene rubbers: vulcanized with

239T22

S alone, without S, with tetra-methylthiuram disulfide, with S and diphenylguanidine accelerator, and with S and mercaptobenzothiazole accelerator. By measuring the strain relaxation at 70° and 100° in an inert atmosphere and using some other data (solubility in synthlm, etc.), these rubbers were characterized with respect to the prevalent bonds. Submitted by Acad P. A. Reblinder 29 May 52.

239T22

Rubber Abstracts  
April 1954  
Crude Rubber

1493. Vulcanisation structures and their effect on the thermal stability and fatigue of rubber. A. A. JUCADIN and Z. N. TARASOV. *Russ. Chem. Rev.*, 1953, 15, 347. *Chem. Abstr.*, 1954, 48, 1617. The bound sulphur present in a vulcanate (a%) consists of b% polysulphide, c% disulphide, and (a-b-c)% monosulphide. The b value can be determined by extracting the vulcanate (after preliminary extraction with cold acetone with 10% sodium sulphate solution) and c is found by treating the vulcanate with hydrochloric acid and determining the evolved hydrogen sulphide. This hydrogen sulphide originates from zinc sulphide and the amount of zinc sulphide is equivalent to that of the S-S group present. Smoked sheet vulcanised with 7% sulphur without an accelerator contained a 3.2, b 0.245, and c 0.57%; a second vulcanisate made with 3% tetramethylthiuram disulphide without sulphur contained a 0.7, b 0, and c 0.02%; a third made with 7% sulphur and 1% diphenylguanidine contained a 4.7, b 0.82, and c 0.62%; and a fourth with 3% sulphur and 1% mercaptobenzthiazole contained a 2.8, b 0.11, and c 0.22%. All vulcanisates contained 5% zinc oxide. When they were kept extended in pure nitrogen at 70° C., the stress  $\sigma$  decreased in time t at a rate which was identical for all the above vulcanisates which shows that, at 70° C. rearrangement of the chains, but no rupture of the cross-linkages occurs. The gradual decrease of  $\sigma$  at 100° or 130° C. was slow for vulcanisates 2 and 4, more





TARASOVA, Z.

B. T. R.  
Vol. 3 No. 4  
Apr. 1954  
Rubber and Elastomers

5724\* Thermal Decomposition of Vulcanized Structures of Deformed Vulcanizates Containing Various Accelerators. D. Doradkin and Z. Tarasova, *Rubber Chemistry and Technology*, v. 26, Oct-Dec. 1953, p. 759-783. (Translated from *Doklady Akademii Nauk SSSR*, v. 85, no. 5, 1952, p. 1069-1072.) Previously abstracted from original. See item 1656, v. 2, Feb. 1953.

PARASOVA, Z.N.

7  
3800. Investigation of the influence of the bonding layers upon the uniformity of phed-up butadiene-styrene vulcanizates. M. K. KIRYUKIN, Z. N. PARASOVA, M. M. BAZNIKOVSKI, and B. A. DORAD.

KIV. Prochnost Svyazi 1954, p 151-7.

Vses. Khim. Otech. on I Mendeleeva.

1954. A comparison of the results for the

test results of the vulcanizates.

It is shown that the use of a bonding layer

improves the uniformity of the vulcanizates.

type research vulcanizates, which are

a bonding agent based on SKS 30 gives excellent

bond strengths. By varying the composition of the

vulcanizing group of SKS 30 vulcanizates, phed up

with a natural rubber bonding agent, the bond

strength can be significantly raised. It is shown

that as a result of the high rate of diffusion of the

low molecular weight ingredients dissolved in the

rubber bonding agent, the bonding layer at the

interface of the vulcanizates is improved and the

uniformity of the vulcanizates is improved.

It is shown that the use of a bonding layer

improves the uniformity of the vulcanizates.

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USSR/ Chemistry - Synthetic rubber

Card 1/1      Pub. 22 - 40/56

Authors      : Tarasova, Z.; Kaplunov, M.; and Dogadkin, B.

Title        : Interchange reactions in vulcanized rubber

Periodical   : Dok. AN SSSR 99/5, 819-822, Dec 11, 1954

Abstract     : Two types of vulcanized butadiene styrene rubber one of which contained S, diphenylguanidine and ZnO and the other - tetramethylthiuramdisulfide and ZnO were investigated to determine the interchange reactions occurring in vulcanized rubber. The method employed in the study of interchange reactions, is described. It was established that the S in polysulfide bonds of vulcanized rubber enter into an isotopic exchange with the radioactive S whereas S in mono- and disulfide bonds will not submit to interchange. The relative S-content in polysulfide bonds is determined by the interchange intensity of the sulfur bound in the vulcanized rubber. Six references: 4-USSR; 1-USA and 1-English (1944-1954). Table; graphs

Institution: Scientific Research Institute of Tire Industry

Presented by: Academician V. A. Kargin, June 22, 1954

TARASOVA, Z.

✓ 1983 Theory of vulcanisation and of the action of  
~~accelerators~~. R. DOGADKIN, V. SELVUKOVA, Z.  
~~TARASOVA, A. DOBROMYSLOVA, M. ISKENDERIN,~~  
~~SK. KADIM, S. DUNOV. Colloid J., U.S.S.R., 1986, 27,~~

199-210. English translation. Vulcanisation of rubber by dibenzthiazolyl disulphide (without sulphur) is a radical-type reaction. Kinetic curves were obtained for the conversion of dibenzthiazolyl disulphide into mercaptobenzthiazole and the addition to the rubber molecules. Changes in molecular weight were followed during vulcanisation of rubber solutions. Vulcanisation troubled the molecular weight. Vulcanisates were found to contain transverse C-C bonds between the molecular chains of rubber and the presence of benzthiazolyl groups in the vulcanisate structure was proved. The kinetics of the vulcanisation of rubber by sulphur in the presence of dibenzthiazolyl disulphide was studied. Seventeen references are given. 35720

TARASOVA, Z.

Theory of vulcanization and the action of accelerators.  
B. A. Degradin, V. Serukova, Z. Tarasova, A. Dobromy-  
alova, M. Bel'dsheln, and M. Samoylov (Moscow, Fine Chem.  
Technol., Moscow). *Kolloid Zhur.* 17, 215-20 (1955); cf.  
C.A. 48, 1947c. Na-butadiene rubber (I) was vulcanized  
by heating at 143° with (e.g., 6%) benzothiazolyl disulfide  
(II) in toluene in N<sub>2</sub>; e.g., after heating for 0 hrs., the mol.  
wt. was 300,000 when the initial mol. wt. was 100,000, and  
the S concn. was 0.1%; about 40% of the initial II was de-  
compd., and about 0.5 the decompd. II was transformed  
into mercaptoheuzothiazole. An analogous vulcanization  
in the solid state gave, in 0 hrs., a product with elasticity  
modulus E of 5 kg./sq. cm. The rate of stress relaxation of  
these vulcanizates was increased by substituting S for a part  
of II; this showed that, in the reaction between I and II,  
more stable C—C bonds form, while the reaction between I  
and S results in less stable —S—S— bonds. The no. of  
bonds produced by 1 mol. of II attached to I was 1.1-5.4.  
The mechanism of this bond formation is discussed. Heat-  
ing of isoprene (III) with II at 125° caused about 30% poly-  
merization of III. When I was vulcanized with a mixt. of S  
and II, the rate of reaction increased linearly with the ratio  
of II to I. The increase of E with the S content of the vul-  
canizate was greater, the greater the proportion of the 1,4-  
isomer in I. The S of the vulcanizate, by using S<sup>2</sup>, was  
shown to exchange with the S in II or with free S. The reac-  
tions of the  $\alpha$ -CH<sub>2</sub> group of rubber chains are very important  
for vulcanization. J. J. Dikertman

(5)

TARASOVA, Z. N.

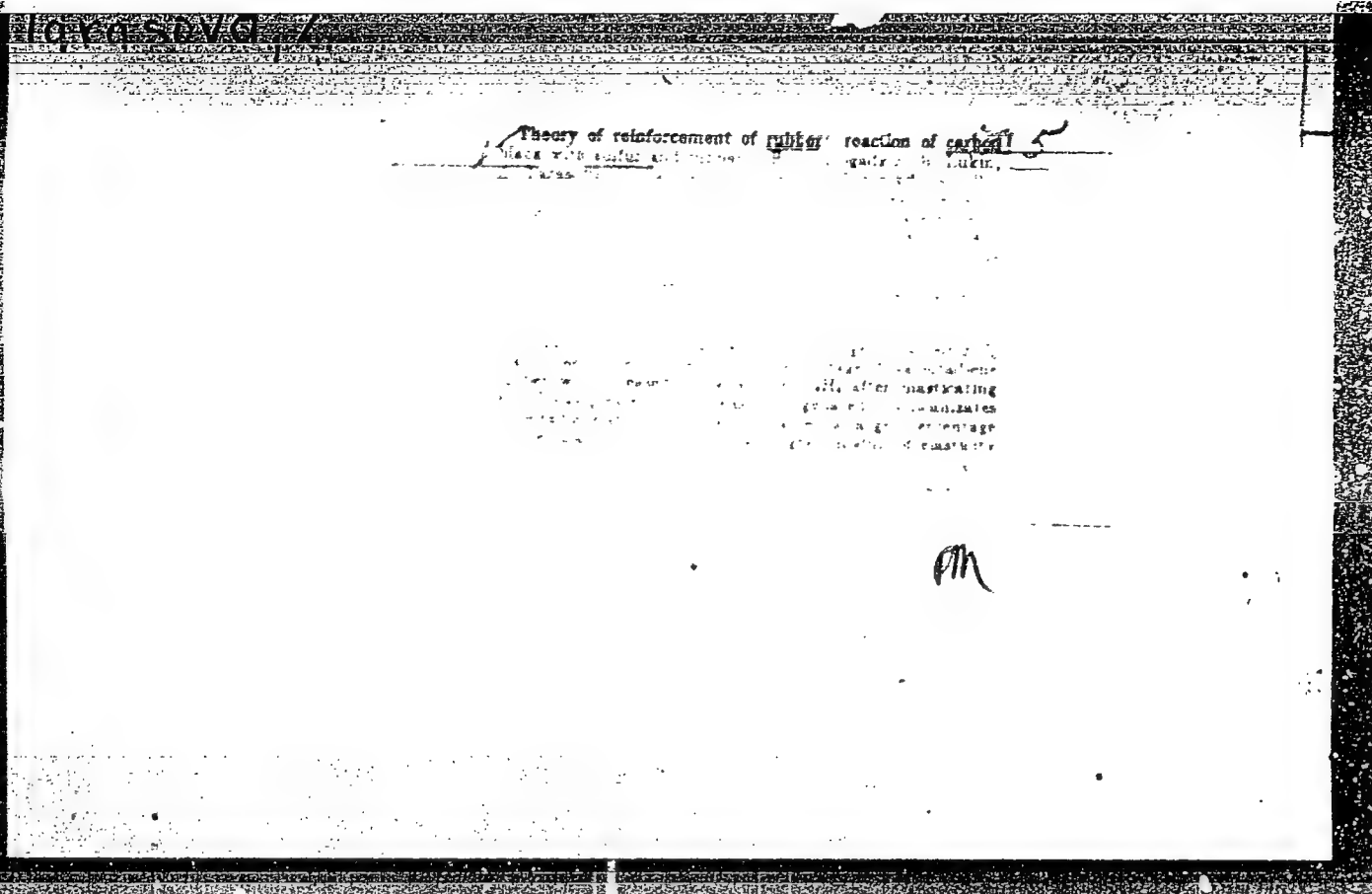
✓497. Use of radioactive sulphur for study and control of the vulcanisation process. Z. N. TARASOVA, M. Y. KAPLUNOV, and B. A. DOGADKIN. *Zavodskaya Lab.*, 1953, 21, 396-7; *Chem. Abstr.*, 1953, 49, 13681. The rubber mixture is compounded with the addition of  $S^{35}$  and the product is milled to about 0.3 mm (approximately the travel distance of emitted electrons). After vulcanisation, the samples are counted for  $S^{35}$ . A calibration curve is shown, which was constructed from the usual oxidation method of detecting sulphur. The method gives results which agree with those of oxidation procedures; it was successfully applied to the study of the course of vulcanisation of several rubber formulations. The time required is 8 to 10 min.

3672

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(2)



PARASOVH, Z.

✓ Theory of reinforcement of rubber reaction of carbon  
black with sulfur and rubber. B. A. Dogadkin, B. Lukin,  
Z. Tarnova, Z. N. Skorodumova, and I. Tutorasil. Col-  
lect J. (U.S.S.R.) 43, 407-12 (1955) (English translation).  
See C.A. 51, 16366. *Mellor*



TARSOVA, Z. N.

TARASOVA

16  
Vulcanization of butadiene-styrene and natural rubber.  
I. I. Etkinson, G. P. Shcherbakov, Z. N. Tarasova, M. K.  
Kliroinov, and N. P. Strel'nikova. U.S.S.R. 106,357,  
July 25, 1957. Methylene blue, Rhodamine B, or methyl  
violet are incorporated in the rubber as vulcanization ac-  
celerators and to prevent scorching. M. Hosh

✓ 4941. Use of radio-active isotopes in the rubber industry. M. YA. KAPLUNOV and Z. N. TARASOVA. Kaucsch. & Kautsch. 1957 18, No. 3, 157-158, 4 figures.

Sci Res Inst Tire Industry

DOGADKIN, B. A., TARASOVA, Z. N., BAS'KOVSKAYA, M.O. and KAPLUNOV, M. Ya.  
(Scientific Research Institute of the Tire Industry)

"The Formation of Vulcanization Structures and Their Modification by Thermo-Chemical Reaction and Fatigue."

Isotopes and Radiation in Chemistry, collection of papers of the  
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and  
Radiation in National Economy and Science, Moscow, 124-vol. AN SSSR, 1963, 100p.

This volume publishes a selection of the Chemistry Section of the  
All-Union Sci. Tech. Conf. on Use of Radioactive and Stable Isotopes and Radiation  
in Economy and the National Economy, sponsored by Acad. Sci. USSR and Natl.  
Admin for Utilization of Atomic Energy (Energoatom) of Ministry of Heavy  
Industry, 1963 April 1-15.

TARASOVA, Z.N., KAPLUNOV, M. Ya. and DOGADKIN, B. A.

"Structure and Properties of Vulcanized Rubbers Obtained by the  
Action of Nuclear Radiation"

Truly Transactions of the First Conference on Radioaction Chemistry, Moscow,  
Izd-vo AN SSSR, 1958. 330pp.  
Conference -25-30 March 1957, Moscow

SOV/132-52-5-4/9

AUTHORS: ~~Tarasova, E.N.,~~  
Kaplunov, M.Ya.,  
Dogadkin, B.A.,  
Karpov, V.L.  
Breger, A.Kh.,

TITLE: Vulcanisation by Nuclear Radiation (Vulkanizatsiya  
pod vozdeystviyem yadernykh izlucheniya)

PERIODICAL: Kauchuk i Rezina, 1958, <sup>17</sup>Nr 5, pp 14-21 (USSR)

ABSTRACT: During recent years it was found that polymeric materials undergo deep structural changes when irradiated with high energy rays (x-rays and nuclear radiation). Investigations on the vulcanisation of rubbers and rubber mixtures by radioactive irradiation were carried out (Refs.1-7). This method of vulcanisation is called "radiation" vulcanisation. The authors investigated the structure and the properties of radiation vulcanisates obtained by irradiating rubbers and their mixtures in an atomic reactor and by gamma radiation from Co<sup>60</sup>. They also determined the conditions for preparing the homogeneous

Card 1/5

33N/13-5 4-4/

# Vulcanization by Nuclear Radiation

solid multi-layer articles (tapes) of the action of nuclear radiation. The following articles were tested: butyl, isoprene-styrene SBR-30, and SBR-30, isoprene SBR and sodium-styrene SBR. The rubber were irradiated in thin layers in the presence of aluminum powder. The degree of cross-linking of the rubber during irradiation depends on the structure of the rubber, the molecular weight of the rubber, the presence of oxygen. The influence of the medium in which radiation takes place on the degree of structure formation of vulcanized natural rubber during radiation vulcanization is shown in Fig. 1; the influence of the medium on the kinetic formation of cross-links during radiation vulcanization is shown in Fig. 2. On studying the infrared spectra it was noted that the presence of a double bond in the structure of the rubber leads to the oxidation processes during irradiation. Spectra of electron paramagnetic resonance showed that SBR-30 irradiated in air has increased

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SOV/138-58-5-4/9

### Vulcanisation by Nuclear Radiation

content of free radicals (Table 3). The effect of anti-oxidants on the properties of radiation vulcanisates is due, to a considerable extent, to the decreased number of double bonds in the presence of anti-oxidants. Fig.2: the relaxation of tension of rubbers subjected to radiation vulcanisation in air; Fig.3: the dependence of the constant of the rate of relaxation of the above vulcanisates on the number of cross-links. Due to the high power of penetration of nuclear rays, uniform vulcanisation is achieved throughout the sample (Table 4). The thickness of the vulcanising grate is defined by the dosage of absorbed energy, by the type and composition of the rubber, by the amount of fillers, plasticisers and anti-oxidants in the mixture and the conditions of irradiation as well as by some other factors. The radiation vulcanisates show thermo-mechanical stability surpassing the stability of vulcanisates containing thiram. Activated carbon decreases the rate of chemical relaxation of radiation vulcanisates.

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SOV/138-58-5-4/9

# Vulcanisation by Nuclear Radiation

During the irradiation of purified rubber, intense oxidation occurs; this leads to complete loss of unsaturation when the dosage of irradiation = 50 megaröntgen. In this case the amount of double bonds is decreased to 30%. Conditions for preparing homogeneous vulcanisation grades were found to be independent from the thickness of the samples (within the limits of 0.1 - 40 mm). The physico-mechanical and technological properties of rubbers prepared by vulcanisation radiation were tested (Table 5). It was found that these vulcanisates were more resistant to thermo-oxidative ageing than sulphur-vulcanisates (4 - 5 times at 130°C), undergo small residual deformation, show low hysteresis and high recovery when subjected to repeated deformation. The vulcanisation of model tyre casings 7.50 x 20, 1/5th natural size, was carried out (Fig.8). Changes in the physico-mechanical characteristics of various tyre cords during irradiation in an atomic reactor are given in Table 7. Members of the Institute

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SOV/138-51-5-4/9

Vulcanisation by Nuclear Radiation

im. L.Ya Karpov: V.B.Osipov, V.A.Sol'din, V.S.Pokrovskiy  
and V.P.Lifonin assisted during these experiments. There  
are 8 figures, 7 tables and 14 references of which  
10 are English and 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut shimoy  
promyshlennosti (Scientific-Research Institute for  
the Tire Industry)

Card 5/5

SOV/138-58-7-2/19

AUTHORS: Dogadkin, B.A., Eytingon, I.I., Tarasova, Z.M., Khromov, M.K., and Strel'nikova, N.P.

TITLE: The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber (Primeneniye alkil-fenolal'degid sul'fidnykh smol dlya povysheniya kleykosti i prochnosti svyazi v izdeliyakh iz butadiyen-stirol'nogo kauchuka)

PERIODICAL: Kauchuk i rezina, 1958, Nr 7, pp 5 - 10 (USSR)

ABSTRACT: Alkylphenolaldehyde sulphide resins increase the adhesion of butadiene-styrene rubber (Ref 1). These resins are obtained by treating the condensation product of n-tert.-butylphenol and formaldehyde with  $SCl_2$  or  $S_2Cl_2$  in an alkaline medium. The condensation product was dissolved in dry dichlorethane and a 20% solution was treated at a temperature equalling its boiling point with  $SCl_2$ , diluted in an equal amount of dichlorethane. The boiling mixture was agitated for 90 minutes and the dichlorethane distilled in a vacuum at  $60^\circ C$ . The softening point of the formed resin =  $53 - 55^\circ C$ . On further heating to  $135^\circ C$ , the softening point increased from  $70$  to  $120^\circ C$ .

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SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

The initial condensation product had an average molecular weight of 260 and the following composition: 75.0% C, 9.2% H, 15.8% O. The molecular weight of the end product = 589 and had the following composition: 73.0% C, 8.6% H, 12.1% O, 6.3% S. The disulphide resins B were prepared by treating the condensation product of alkylphenol and formaldehyde with  $S_2Cl_2$  in substantially the

same way as alkylphenolaldehyde monosulphide resins. The molecular weight of this resin = 589 which was approximately equal to the calculated value (585). Sulphide resins C were prepared from alkylphenol formaldehyde lacquer resins Nr 101 (VTO MKHP 2196-50) which is prepared by condensing n.-tert.-butylphenol with formaldehyde in an alkaline medium, and subsequently neutralising it with  $H_2SO_4$  and hardening at 140 °C. The physico-mechanical properties of adhesives based on butadiene-styrene rubber SKS-30A containing sulphide resins and vulcanised in the

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SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

absence of sulphur or accelerators for 60 minutes at 143 °C, are listed (Table 1). Sulphide resins increase the degree of vulcanisation but alkylphenolaldehyde resins decrease the degree of vulcanisation of rubbers based on SKS-30A (Table 2). The sulphide resins impart to the resins high moduli and a high degree of break-strength. Sulphide resins have the same degree of thermal stability and resistance to ageing as rubbers not containing these resins or phenolaldehyde resins. 60% of the total amount of sulphur, introduced into the rubber in the form of a resin, is chemically bound to the rubber. Sulphide resins also strengthen the rubber. From Table 3, it can be seen that the sulphide resins increase the dynamic modulus, internal friction and the strength of the rubbers. The effect of sulphide resins on the adhesive properties of adhesives based on SKB-30A is shown in figure 2 and Table 4. An increase in the content of sulphur and accelerators (up to 5-10%) results in increased efficiency of the rubbers (figure 3). The degree of deformation was

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SOV/138-58-7-2/19

The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the Adhesion and Strength of Bonds in Products Made from Butadiene-styrene Rubber

found to be in an inverse proportion to the modulus. However, an increase in the content of sulphur and accelerators in the adhesives achieves better co-ordination of various layers and a very strong layer is formed in the contact region. Sulphide resins are very good adhesives. An increase in the strength of the bond of the vulcanised rubbers is achieved without lowering the adhesive properties. The investigated alkylphenolaldehyde resins inhibit the vulcanisation of rubbers and thus decrease the strength of the bonds. Resins which simultaneously decrease the degree of vulcanisation of the rubbers as, for instance, resin Nr 101, decrease also the strength of the bonds of the rubbers.

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SOV/138-58-7-2/19  
The Use of Alkylphenolaldehyde Sulphide Resins for Increasing the  
Adhesion and Strength of Bonds in Products Made from Butadiene-  
styrene Rubber

There are 3 Figures, 4 Tables and 6 references, 2 of which  
are English and 4 Soviet.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlen-  
nosti (Scientific Research Institute of the Tyre  
Industry)

Card 5/5

1. Resins--Applications
2. Synthetic rubber--Bonding
3. Synthetic rubber--Properties

TARASOVA, Z. N.

69-20-1-7/20

AUTHORS: Dogadkin, B.A., Kuleznev, V.N., Tarasova, Z.N.

TITLE: Formation and Properties of Interpolymers of Natural and Butadiene-Styrene Rubbers (Polucheniye i svoystva mezhpolymerov natural'nogo i butadienstirol'nogo kauchukov)

PERIODICAL: Kolloidnyy Zhurnal, 1958, Vol. XX, # 1, pp 43-51 (USSR)

ABSTRACT:

The coplastication of natural and butadiene-styrene rubbers by milling on a cold mill leads to the formation of an interpolymer containing 30% of the natural rubber introduced. The plastication was carried out on a specially constructed micro-mill in a hermetic casing. The milling was done in an atmosphere of purified nitrogen. The rubbers were preliminarily purified by hot acetone (natural rubber) or hot methanol (butadiene-styrene rubber). The values for the characteristic viscosity and plasticity during milling are represented in figures 1 and 2. To prove the formation of an interpolymer during milling, several methods were used. In one, fractional precipitation, a selective precipitator had to be found; used was a binary mixture (1 : 4) of benzene-methylethylketone, in which

Card 1/4

69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene Rubbers

butadiene-styrene rubber dissolves completely, whereas natural rubber does not dissolve. For comparison the milled polymers were also dissolved. The solution was then separated, evaporated, and the content of natural rubber determined by an Abbe refractometer. Fig. 3 shows that in case of separately milled polymers the natural rubber begins to dissolve after 40 min. For selective vulcanization, polychloro-compounds were used, which do not vulcanize natural rubber. As an activator, ZnO and PbO in two parallel experiments was employed. The results have shown that 20-26% of the introduced natural rubber is being bound during plastication. The characteristic viscosity depends on the ratio of the rubbers in the mixture. Fig. 5 shows, that the values for the viscosity of the jointly milled polymers are higher than the corresponding values of the separately milled polymers. The investigation of the physical-chemical properties of the vulcanizates shows that the mixtures of natural and butadiene-styrene rubbers have a higher resistance to aging than natural rubber alone. The resistance to breaking, relative stretching and deformation is also dependent on the composition

Card 2/4



69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene Rubbers

of the mixture. An adhesive film made from interpolymers increases the binding strength between natural and butadiene - styrene rubbers when placed between them. It is supposed that the segments of the molecules of the natural rubber in the interpolymer, which are connected with the butadiene-styrene rubber by chemical bonds, penetrate easily into the natural rubber. The same is true for the segments of the butadiene-styrene rubber of the interpolymer, which penetrate into the butadiene-styrene rubber. The results of the tests for resistance of the connections by interpolymer adhesive films are shown in table 2.

There are 9 figures, 2 tables, and 7 references, 3 of which are Soviet, 4 English.

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69-20-1-7/20

Formation and Properties of Interpolymers of Natural and Butadiene Styrene  
Rubbers

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni  
M.V. Lomonosova (Moscow Institute of Fine Chemical Technology  
imeni M.V. Lomonosov). Nauchno-issledovatel'skiy institut  
shinnoy promyshlennosti (Scientific Research Institute of  
the Tire Industry)

SUBMITTED: July 12, 1957

AVAILABLE: Library of Congress  
Card 4/4

69-20-3-2/24

AUTHORS: Dogadkin, B.A.; Tarasova, Z.N.; Kaplunov, M.Ya.; Karpov, V.L.;  
Klauzen, N.A.

TITLE: The Structure and Properties of Rubbers Produced in Irradiation  
Vulcanization (Struktura i svoystva rezin, poluchennykh pri  
radiatsionnoy vulkanizatsii)

PERIODICAL: Kolloidnyy zhurnal, 1958, vol XX, Nr 3, pp 260-271 (USSR)

ABSTRACT: The vulcanization of rubber products by different nuclear  
radiation sources has aroused great interest in the last  
years. The irradiated rubber products usually show better  
mechanical and chemical properties than those vulcanized by  
present methods. Rubbers of the types SKS-30A, SKI, SKB,  
and natural rubber were tested. The samples were irradiated  
in an atomic reactor or by a Co<sup>60</sup> source with a dose of  
10<sup>7</sup>-10<sup>8</sup> r. The investigation of the infrared absorption  
spectra has shown that in the 5.8  $\mu$  field a broad absorption  
band corresponds to the carbonyl groups of acids, aldehydes,  
and ketones. In the 2.8  $\mu$  field the absorption band of  
the hydroxyl groups is shown. The density of the network  
formed during irradiation vulcanization is determined by  
the energy dose absorbed, by the type and the composition

Card 1/3

69-20-5-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

of the rubber, carbon black and antioxidant, as well as by the irradiation conditions. The number of cross bonds per 100 eV in an air medium is, 12 in extracted butadienstirol rubber; 4 in extracted natural rubber; 2.5 in technical SKS-30A. The structurization effect is increased by an increase in temperature, and decreased in the presence of an inhibitor (phenyl- $\beta$ -naphthylamin). A correlation has been found between the relative rate of chemical stress relaxation and the density of the vulcanizate network which is due to the formation of C-C bonds during irradiation. The degree of crystallization in the rubber decreases when the irradiation doses are increased. At a dose of 20-30  $\cdot 10^6$  r the crystallization is the same as in sulfur vulcanizates of similar network density. Compared with sulfur vulcanizates, the irradiation samples show an aging resistance 4-5 times higher at 130°C, a lower residual deformation, a low hysteresis, a high temperature resistance, etc. There are 12 graphs, 6 tables, and 8 references, 5 of which are Soviet and 3 English.

Card 2/3

69-20-3-2/24

The Structure and Properties of Rubbers Produced in Irradiation Vulcanization

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti;  
Moskva (Scientific Research Institute of the Tire Industry,  
Moscow)

SUBMITTED: October 30, 1957

Card 3/3

1. Rubber--Vulcanization    2. Rubber--Properties    3. Rubber  
--Radiation--Applications

DOGADKIN, B.A.; EYTINGON, I.I.; FEL'DSHTYIN, M.S.; ~~TARASOVA, Z.N.~~;  
TUR'YANOVA, Ye.N.; LIN'YAN. TSIN'; KLAUZEN, N.A.; PEVZNER, D.M.

Vulcanization of rubber in the presence of aminomethyl derivatives  
of 2-mercaptobenzothiazole as accelerators. Koll.zhur. 21 no.4:  
427-435 J1-Ag '59. (MIRA 13:8)

1. Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,  
Moskva. (Vulcanization) (Benzothiazole)

SCV/69-21-4-10/22

5(4)

AUTHOR:

Dogadkin, B.A., Eytingon, I.I., Fel'dshteyn, M.S., Tarasova, Z.N.,  
Gur'yanova, Ye .N., Lin Yang Ch'ih, Klausen, H.A. and Pavzner,  
D.M.

TITLE:

Vulcanization of Rubber in the Presence of Aminomethyl Derivatives of 2-Mercaptobenzothiazole

PERIODICAL:

Kolloidnyy zhurnal, 1959, Vol XXI, Nr 4, pp 427-435 (USSR)

ABSTRACT:

The authors synthesized a number of compounds, condensation products of 2-mercaptobenzothiazole and formaldehyde with various amines, to test them as accelerators of vulcanization in mixtures of synthetic and natural rubbers. According to the data of spectral analysis, the chemical structure of these 2-mercaptobenzothiazole derivatives is characterized by the presence of a -S-C-N- group. The experiments proved that aminomethyl derivatives of 2-mercaptobenzothiazole are effective accelerators of the vulcanization process. Figure 3 (graph) shows the vulcanizing activity of these derivatives in comparison with

Card 1/2

SOV/69-21-4-16/22

Vulcanization of Rubber in the Presence of Aminomethyl Derivatives of  
2- Mercaptobenzothiazole

the effect of sulfenamide accelerators. It was further found that vulcanization of rubber mixtures with aminomethyl derivatives is characterized by higher rates in the initial period as compared with vulcanization of mixtures containing sulfenamide accelerators. In comparison with the latter, aminomethyl derivatives enter into isotopic exchange with di-2-benzothiazolil-disulfide at lower temperatures (graphs 6 and 7). Aminomethyl derivatives of 2-mercaptobenzothiazole do not exert an independent structurizing (vulcanizing) effect on rubber (table 3). In this respect they differ from the sulfenamide compounds. There are 7 graphs, 3 tables and 7 Soviet references.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti,  
Moskva (Scientific Research Institute of the Tire Industry,  
Moscow)

SUBMITTED: 23 December, 1958  
Card 2/2



S/138/59/000/011/002/011  
A051/A029

15.9210 also 2109, 2209

AUTHORS: Tarasova, Z. N.; Fedorova, T. V.; Dogadkin, B. A.

TITLE: The Effect of the Vulcanization Temperature on the Structure and Properties of Vulcanizates Made of Butadiene-Styrene and Isoprene Rubbers

PERIODICAL: Kauchuk i Rezina, 1959, No. 11, pp. 7-14.

TEXT: The temperature effect (between 133 and 200°C) on the structure of CKC-30AM (SKS-3OAM), CKM (SKI) and vulcanizates was studied in order to find a way to intensify the vulcanization process and obtain rubber resistant to high temperatures. The thermal and thermo-oxidizing treatment of the butadiene-styrene rubbers at 200°C causes structuralizing. The effect of the structuralizing was evaluated by the magnitude of maximum swelling and from the physico-mechanical properties. Figure 1 indicates that the presence of admixtures in the rubbers affects the structuralizing process. The SKS-3OAM rubbers, extracted with ethanol-toluene have a higher rate and degree of structuralizing. It is found that the structuralizing greatly increases with the introduction of carbon blacks into the SKS-3OAM-based

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S/138/59/000/011/002/011  
A051/A029

The Effect of the Vulcanization Temperature on the Structure and Properties of Vulcanizates Made of Butadiene-Styrene and Isoprene Rubbers

rubber mixtures, whereby the channel carbon black causes the greatest effect. An infrared spectral analysis of commercial and purified SKS-30AM was conducted, over a period of 6 hours, and it was seen that both vulcanizates exhibit only slight oxidation as compared to the initial rubber. The unsaturation of the rubber greatly decreased as a result of heating. The data of the infrared spectra show that the presence of the 1,4 double bonds decreases in unpurified commercial rubber from 79 to 29% and in the extracted rubber to 32% (Table 1). This is due to the formation of intra-molecular cyclic structures and to oxidation, and not to the polymerization processes taking place, since the number of formed transverse bonds corresponds to the loss of no more than 2% of the double bonds, if it is considered that the process takes place completely along these bonds. Further studies were made on vulcanizates from SKS-30AM rubber, obtained with various accelerators, as to the effect of temperatures within the range of 133-173°C on the structure and properties of these vulcanizates. It was seen that in the vulcanization of non-filled mixtures from SKS-30AM and SKI with sulphenamide accelerators a clearly expressed reversion takes place which is

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S/138/59/000/011/002/011

A051/A029

The Effect of the Vulcanization Temperature on the Structure and Properties of Vulcanizates Made of Butadiene-Styrene and Isoprene Rubbers

intensified with an increase in the vulcanization temperature. This reversion depends mostly on the destruction of the transverse sulfur bonds under the effect of the amines forming due to the decomposition of the accelerators and also on the acceleration of the thermooxidizing processes under the effect of the forming mercaptanes. A decrease of the reversion and an improvement of properties of SKS-3OAM and SKI is observed with an increase in the vulcanization temperature if sulphenamide accelerators are used, applying the vulcanization system containing NN-diethyl-2 benzothiazole sulphenamide and tetramethylthiurammonosulfide. There are 3 tables, 7 sets of graphs and 8 references: 6 Soviet, 2 English. ✓

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti  
(Scientific Research Institute of the Tire Industry)

Card 3/3

TARASOVA, Z.

~~SECRET~~ (C.D.)

PHASE I BOOK EXPLOITATION SOV/5410

Tashkent'skaya konferentsiya po mirnomu ispol'zovaniyu atomnoy energii. Tashkent, 1959.

Trudy (Transactions of the Tashkent Conference on the Peaceful Uses of Atomic Energy) v. 2. Tashkent, Izd-vo AN UzSSR, 1960. 449 p. Errata slip inserted. 1,500 copies printed.

Sponsoring Agency: Akademiya nauk Uzbekskoy SSR.

Responsible Ed.: S. V. Starodubtsev, Academician, Academy of Sciences Uzbek SSR. Editorial Board: A. A. Abdullayev, Candidate of Physics and Mathematics; D. M. Abdurizulov, Doctor of Medical Sciences; U. A. Arifov, Academician, Academy of Sciences Uzbek SSR; A. A. Borodulina, Candidate of Biological Sciences; V. N. Ivashev; G. S. Ikramova; A. Ye. Kiv; Ye. M. Ischanov, Candidate of Physics and Mathematics; A. I. Nikolayev, Candidate of Medical Sciences; D. Nishanov, Candidate of Chemical Sciences; A. S. Sadykov, Corresponding Member, Academy of Sciences USSR, Academician, Academy of Sciences Uzbek SSR; Yu. N. Talanin,

Card 1/20

170

Transactions of the Tashkent (Cont.)

SOV/5410

Candidate of Physics and Mathematics; Ya. Kh. Turakulov, Doctor of Biological Sciences. Ed.: R. I. Khamidov; Tech. Ed.: A. G. Babakhanova.

PURPOSE: The publication is intended for scientific workers and specialists employed in enterprises where radioactive isotopes and nuclear radiation are used for research in chemical, geological, and technological fields.

COVERAGE: This collection of 133 articles represents the second volume of the Transactions of the Tashkent Conference on the Peaceful Uses of Atomic Energy. The individual articles deal with a wide range of problems in the field of nuclear radiation, including: production and chemical analysis of radioactive isotopes; investigation of the kinetics of chemical reactions by means of isotopes; application of spectral analysis for the manufacturing of radioactive preparations; radioactive methods for determining the content of elements in the rocks; and an analysis of methods for obtaining pure substances. Certain

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Transactions of the Tashkent (Cont.)

SOV/5410

instruments used, such as automatic regulators, flowmeters, level gauges, and high-sensitivity gamma-relays, are described. No personalities are mentioned. References follow individual articles.

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7

Taksar, I. M., and V. A. Yanushkovskiy [Institut fiziki AN Latv SSR - Institute of Physics AS Latvian SSR]. Problems of the Typification of Automatic-Control Apparatus Based on the Use of Radioactive Isotopes

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- Borukhov, M. Yu., and A. T. Lebedev [Institute of Nuclear Physics  
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Card 5/20

15.9202

11.2211

31979  
S/081/61,000/023/056/061  
B106/B101

AUTHORS: Tarasova, Z., Kaplunov, M., Vas'kovskaya, M., Dogadkin, B.

TITLE: Vulcanization structures and their effect on fatigue

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 23, 1961, 560 - 561,  
abstract 23P351. (Sb. "Vulkanizatsiya rezin. izdeliy",  
Yaroslavl', 1960, 25 - 42)

TEXT: Vulcanizates of Hk(NK), butadiene styrene, and Na butadiene rubber with the accelerators Thiuram, diphenyl guanidine, captax, altax, and radiation vulcanizates of these rubbers have been examined to determine the type of cross linking. The latter was determined by isotopic exchange with sulfur, vulcanizing accelerators, vulcanizates containing radioactive sulfur, and by the method of determining the rate constant of relaxation of tension at constant deformation (Dogadkin, Tarasova, Kolloid. zhurnal, v. 15, no. 5, 1953, 347). The factors determining the exchangeability are the nature of the rubber and the composition of the vulcanizing group. The poorer the exchangeability, the higher the thermomechanical stability. The exchangeability of sulfur compounds decreases with increasing

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Vulcanization structures and their...

31979  
S/081/61/000/023/056/061  
B106/B101

temperature and duration of vulcanization. The relative rate of exchange is higher at the beginning of vulcanization than later on. The number of exchangeable bonds passes through a maximum which corresponds to an optimum of vulcanization. The vulcanization temperature has different effects on the structure of the vulcanizate, which depend on the nature of rubber and the accelerators. Samples of CAC-30 (SKS-30), NK, and CKB (SKB) rubber containing Thiuram, diphenyl guanidine, captax, and hexachlorane were subjected to fatigue tests by symmetrically alternating load. The fatigue resistance of vulcanizates rises with increasing energy of cross links. The variation in density of the vulcanization network of samples subjected to fatigue tests is determined by the nature of rubber and of the system of vulcanization, and depends on the direction of the regrouping processes of the radicals which are formed when the polymer chains and the bridge bonds break up. Fatigue at low temperatures (20 - 40°C) increases the exchangeability of vulcanizates, whereas it is reduced by fatigue at 100°C and higher temperatures. The fatigue resistance of rubber can be increased by adding acceptors for free radicals (disulfide p-tert-butyl phenol, hexachloroethane). [ Abstractor's note: Complete translation. ]

Card 2/2

S/138/60/000/003/007/007  
A051/A029

AUTHORS: Tarasova, Z.N.; Priss, L.S.; Smirnova, L.A.

TITLE: The VII Scientific Conference for High-Molecular Compounds <sup>III</sup>

PERIODICAL: Kauchuk i Rezina, 1960, No. 3. p. 54

TEXT: The VII nauchnaya konferentsiya po vysokomolekulyarnym soyedineniyam (VII Scientific Conference on High-Molecular Compounds) took place on February 8 - 13, 1960, in Leningrad. It was organized by the Institut vysokomolekulyarnykh soyedineniy (Institute of High-Molecular Compounds) (IVS) of the AS of the USSR. There were 57 papers presented on the following subjects: the mechanism of polymerization and destruction, stereo-regular polymers, the synthesis of polymers, the mechanical properties of polymers, solutions of polymers, cellulose and its derivatives, the relaxation properties and structure of polymers, biopolymers. A paper on the investigation of molecular weight distribution of polycondensation products was presented by S.E. Bresler, Yu.Ya. Gotlib and S.Ya. Frenkel. Macroradicals were also investigated by these authors. A number of papers was dedicated to the subject of the effect of orientation and molecular weight on the strength and creeping of various polymers in the vitrified state. ✓

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S/138/60/000/003/007/007  
A051/A029

The VII Scientific Conference for High-Molecular Compounds

Ye.V. Kuvshinskiy and M.Ye. Bessonov submitted a paper on the features of "silver cracks" in polymethylmethacrylate. The study of polymers by the method of dielectric loss was discussed in the paper by G.P. Mikhaylov and co-workers. An interesting method for determining the mobility of the chains of polymer molecules in a block was suggested by Ye.V. Anufriyeva. Over 600 specialists from more than 50 institutes took part in the conference. ✓

Card 2/2

15.9120

2209, 1403, 1138 only

86295

S/190/60/002/008/007/017  
B004/B054

AUTHORS:

Tarasova, Z. N., Kaplunov, M. Ya., Kozlov, V. T.,  
Klauzen, N. A., Dogadkin, B. A.

TITLE:

Interaction of Sulfur With Natural Rubber Under the Action  
of Ionizing Radiation

PERIODICAL:

Vysokomolekulyarnyye soyedineniya, 1960, Vol. 2, No. 8,  
pp. 1201-1206

TEXT: The authors study the problem of production of radiation-resisting rubbers, the conditions for a common vulcanization of irradiated and sulfurated rubbers, and the modification of rubbers treated with radiation. The present paper gives the first informative results of investigation of the effect of radiation by  $\text{Co}^{60}$  on rubber in the presence of sulfur. A considerable sulfur addition occurred at  $25^{\circ}\text{C}$ , and was accelerated by an increase in the radiation dose and temperature, particularly by addition of hexane chloro ethane. In thermal vulcanization, the admixture of chloro derivatives showed no effect on sulfur addition. The presence of sulfur delays the structuration as compared with rubber without sulfur admixture.

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86295

Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017  
the Action of Ionizing Radiation B004/B054

But structuration increases also here between  $-80^{\circ}\text{C}$  and  $+100^{\circ}\text{C}$  with increasing temperature. Pure rubber showed at  $50^{\circ}\text{C}$  a reversion of the structuration process, which was not observed in the presence of sulfur in the temperature range investigated. A study of the infrared spectra in argon of irradiated rubbers with and without sulfur showed a decrease in intensity of the  $840\text{ cm}^{-1}$  band due to a reduced degree of nonsaturation. This effect was more intense in the presence of sulfur. The decrease in intensity of the  $2940$  and  $1450\text{ cm}^{-1}$  bands due to a reduced number of  $\text{CH}_2$  groups or ring

formation was, however, more intense in the presence of sulfur. An investigation of the sulfur exchange at  $120^{\circ}\text{C}$  in irradiated rubber tagged with radioactive sulfur, carried out by a method described in Ref. 7, showed that about 40% of sulfur is exchangeable. This amount does not depend on the radiation dose (up to 100 megarepents). The high degree of exchangeability is ascribed to a formation of polysulfide groups. Sulfurous rubbers with addition of hexachloro ethane showed, on irradiation with 20 megarepents, maximum values of tensile strength (about  $130\text{ kg/cm}^2$ ) and of elongation. When irradiating pure rubber, a maximum (about  $100\text{ kg/cm}^2$ ) is only attained at 50-70 megarepents. Sulfurous irradiated vulcanizates showed a faster stress relaxation than irradiated vulcanizates free from

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Interaction of Sulfur With Natural Rubber Under S/190/60/002/008/007/017  
the Action of Ionizing Radiation B004/B054

sulfur. The authors assume that sulfur addition leads to a more homogeneous and regular structure since secondary reactions causing chain ramification are inhibited. There are 7 figures and 7 references: 3 Soviet, 3 US, and 1 British.

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti  
(Scientific Research Institute of the Tire Industry)

SUBMITTED: March 24, 1960

Card 3/3

TARASOVA, Z.N.; PRISS, L.S.; SMIRNOVA, L.A.

Seventh scientific conference on high molecular weight com-  
pounds. Nauch. i raz. 19 no.3:54 M. '60. (MIRA 13:6)  
(Macromolecular compounds--Congresses)

69468

S/069/60/022/02/021/024  
D034/D002

5+  
15.9120

AUTHOR:

Tarasova, Z.N., Dogadkin, B.A., Arkhangel'skaya, M.I.  
Petrova S.B.

TITLE:

The Structure and Properties of Vulcanizates of  
Carboxylated Rubber<sup>1</sup> Produced by the Combined Action  
of Metal Oxides and High Energy Radiation<sup>6</sup>

PERIODICAL:

Kolloidnyy zhurnal, 1960, Vol XXII, Nr 2, pp 253-256  
(USSR)

ABSTRACT:

On the basis of a number of investigations the authors  
of the article discuss the effect of the structure  
of vulcanizates of carboxylated rubber on their  
strength properties.<sup>6</sup> It could be established that  
the rate constant of stress relaxation of these  
vulcanizates at 150°C is about 50-100 fold that of  
the vulcanizates with polysulfide bonds [Ref. 1].  
Investigation of the change of osmotic and viscosi-

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69468

S/069/60/022/02/021/024  
D034/D002

The Structure and Properties of Vulcanizates of Carboxylated Rubber  
Produced by the Combined Action of Metal Oxides and High Energy  
Radiation

metric properties of rubber mixture and vulcanizate solutions prior to and after relaxation showed that the molecular weight does not considerably change. This in connection with the observed preservation of the number of cross links during relaxation suggests the conclusion that the weakening of the stress during the relaxation of carboxylated rubber vulcanizates with salt type cross bonds is due to the disintegration of the latter and the rising of new bonds as a result of exchange reactions. The low thermal stability of salt type bonds requires additional introduction of stable bonds into the vulcanization network. Good results were obtained with Co-60 treatment of carboxylated rubber preliminarily vulcanized

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69168

S/069/60/022/02/021/024

D034/D002

The Structure and Properties of Vulcanizates of Carboxylated Rubber  
Produced by the Combined Action of Metal Oxides and High Energy  
Radiation

with metal oxides. The formation of a limited number  
of cross bonds-C-C- (approximately 1 per 1000 mono-  
mer units) permits preparing vulcanizates of high  
thermal stability and strength. The strength of such  
vulcanizates exceeds 400 kg/cm<sup>2</sup>. There are 1 graph,  
1 table and 4 references, 3 of which are Soviet  
and 1 English. X

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promysh-  
lennosti, Moskva (Scientific Research Institute of  
the Tire Industry, Moscow)

SUBMITTED: November 9, 1959

Card 3/3

1.2211  
5.9300  
AUTHORS:

S/081/62/000/003/085/09  
B 162/B101  
Dogadkin, B. A., Tarasova, Z. N., Kaplunov, M. Ya., Breger,  
A. Kh., Kopersha, L. M., Vaynshteyn, B. I., Vizel', Ya. M.,  
Karpov, V. L.

TITLE:

PERIODICAL: Intensification of the process of radiation vulcanization  
and technical principles of an experimental installation for  
radiation vulcanisation of tyres  
Referativnyy zhurnal. Khimiya, no. 3, 1962, 595 - 596,  
abstract 3P275 (Sb. "Radioakt. izotopy i yadern. izlucheniya  
v nar. kh-ve SSSR, v. I", M., Gostoptekhnizdat, 1961, 184 - 196)

TEXT: An investigation was made into the effect of medium (air and vacuum),  
temperature (from -196 to 100°C), sensitizers and inhibitors on radiation  
vulcanization under the action of Co <sup>60</sup> γ - radiation of butadiene,  
butadiene-styrene and natural rubber. The degree of cross-linking in air  
is higher than in vacuum. In the presence of 2 % phenyl - β - naphthyl-  
amine the radiation-chemical yield of cross-links per 100 ev of absorbed

FOR RELEASE: 07/13/2001  
Car 1/3

Intensification of the process ...

S/081/62/000/003/085/090  
B162/B101

energy drops by half for butadiene rubber in vacuum. The decrease in non-saturation is only partially explained by cross-linking and oxidation, and in the main this phenomenon is probably connected with the formation of intra-molecular rings. The cross-linking at different temperatures depends to a large extent on the structure of the rubber. Aliphatic polyhalides reduce the required radiation dose by half (to 25 Mr) and ensure the production of rubbers with a static strength equal to the strength of the best sulphur vulcanized rubbers. Vulcanization of rubbers containing carboxyl by the combined action of metal oxides and nuclear radiation (dose 10 Mr) gives vulcanized rubbers with high thermal stability and high strength properties. An investigation was made into the kinetics of the addition of styrene and 2,5 -dichlorostyrene to natural rubber and butadiene-styrene rubber and to mixtures of these with channel black with irradiation in Ar. An acceleration of vulcanization was observed in the presence of these monomers and vulcanized rubbers were obtained which possessed high thermomechanical stability and strength. The technical principles of a technological process for an experimental installation for radiation vulcanization of tyres are examined. Different types of  $\gamma$ -radiation sources were compared: radiation in-Ga loop of a nuclear reactor,

Card 2/3

28800

15.9130

S/138/61/000/009/004/011  
A051/A129

AUTHORS: Tarasova, Z. N., Eytingon, I. I., Senatorskaya, L. G., Fedorova, T. V.,  
Dogadkin, B. A.

TITLE: Application of phenothiazine (thiodiphenylamine) as an antifatigue  
agent of NR, CKH(SKI) and CKC-30AM (SKS-30AM) vulcanizates

PERIODICAL: Kauchuk i rezina, no. 9, 1961, 15 - 18

TEXT: A study was carried out to determine the action of phenothiazine during the vulcanization and fatigue of NR, SKI and SKS-30AM rubbers. It was established that phenothiazine has no significant effect on the kinetics of vulcanization and on the standard physico-mechanical properties of the vulcanizates. It increases the durability of the vulcanizates from the given rubbers during the process of repeated deformations under various conditions of fatigue. Phenothiazine or the products of its transformation combine with the vulcanizate under the effect of thermo-oxidizing action and repeated deformations. No combining of phenothiazine was noted during the process of thermal action alone. Phenothiazine in conjunction with certain oxidation inhibitors has more than just an additive action (mutually-intensifying action). A study of the exchange ability of the

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X

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Application of phenothiazine...

S/138/61/000/009/004/011  
A051/A129

vulcanizates with elemental sulfur showed that phenothiazine does not affect the nature of the vulcanizing structures, and during vulcanization at 143°C causes noticeable changes in the type of the sulfur bonds at temperatures of 173°C. A further study of its ability to react in isotope exchange with elemental sulfur showed that under vulcanization at 173°C there is no noticeable sulfur exchange in phenothiazine. Data of Table 1 reveal that phenothiazine reduces the rate of chemical relaxation by 3 to 7 times in NR vulcanizates and by a factor of two in vulcanizates of SKI, and by 2 - 3 times in SKS-30A vulcanizates. It has a more effective action in rubbers produced at elevated vulcanizing temperatures than other known anti-fatigue agents, such as N-phenyl-N'-cyclohexyl-n-phenylenediamine (4010). Phenothiazine increases the durability of the vulcanizates during the process of repeated deformations in symmetrical sign-changing loading and in repeated bending. It reacts with the products of oxidation, stabilizing the latter and thus preventing the further development of the thermo-oxidizing destruction. The application of a system of inhibitors having a combined intensifying action shows promise in extending the service life of rubbers and stabilizing them. There are 2 tables, 1 set of graphs and 9 references: 6 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows:

Card 2/4

S/081/62/000/003/085/090  
B162/B101

Intensification of the process ...

energy drops by half for butadiene rubber in vacuum. The decrease in non-saturation is only partially explained by cross-linking and oxidation, and in the main this phenomenon is probably connected with the formation of intra-molecular rings. The cross-linking at different temperatures depends to a large extent on the structure of the rubber. Aliphatic polyhalides reduce the required radiation dose by half (to 25 Mr) and ensure the production of rubbers with a static strength equal to the strength of the best sulphur vulcanized rubbers. Vulcanization of rubbers containing carboxyl by the combined action of metal oxides and nuclear radiation (dose 10 Mr) gives vulcanized rubbers with high thermal stability and high strength properties. An investigation was made into the kinetics of the addition of styrene and 2,5 -dichlorostyrene to natural rubber and butadiene-styrene rubber and to mixtures of these with channel black with irradiation in Ar. An acceleration of vulcanization was observed in the presence of these monomers and vulcanized rubbers were obtained which possessed high thermomechanical stability and strength. The technical principles of a technological process for an experimental installation for radiation vulcanization of tyres are examined. Different types of  $\gamma$ -radiation sources were compared: radiation In-Ga loop of a nuclear reactor,

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Intensification of the process ...

S/081/62/000/003/085/090  
B162/B101

spent-fuel assemblies, Co<sup>60</sup> and different types of irradiators. A scheme is proposed for a technological process for an experimental installation with spent-fuel assemblies. [Abstracter's note: Complete translation]

✓

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28800

S/138/61/000/009/004/011

A051/A129

Application of phenothiazine...

Murphy, Ravner, Smith, Ind. Eng. Chem., 42, no. 2, 2479 (1950); A. Tobolsky, J. Appl. Phys., 27, no. 7, 673 (1956).

ASSOCIATION: Nauchno-issledovatel'skiy institut shinnoy promyshlennosti (Scientific Research Institute of the Tire Industry)

Table 1. Effect of the type of the anti-fatigue agent introduced into the mixture on the rate of chemical relaxation of tension and the durability of the vulcanizates during the fatigue process (dosage of anti-fatigue agent 1.0 w.p. to 100 w.p. of rubber)

Type of rubber	Type of anti-fatigue agent	Vulcanization conditions		Rate of relaxation constant at 130°C, min <sup>-1</sup> · 10 <sup>-3</sup>		Durability in deformations, 1,000 cycl.	
		temp., °C	duration, min	in air	in non-oxygen conditions	symmetr. loading at 100°C	repeated bending pinning at 20°C
NR	without anti-fatigue agent	143	20	38.0	1.11	1,934	-
	phenothiazine . . . .	143	20	11.5	1.57	3,217	-

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28800

S/138/61/000/009/004/011  
A051/A129

Application of phenothiazine...

Table 1. (continued)

N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	143	20	7.4	-	5.489	-
without anti-fatigue agent	173	5	-	-	-	292
phenothiazine	173	5	6.1	-	-	600
N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	173	5	12.7	-	-	405
without anti-fatigue agent	143	20	42.3	-	6.746	-
phenothiazine	143	20	13.8	-	8.390	-
N-phenyl-N'-cyclohexyl-n-phenylene-diamine (4010)	143	20	19.9	-	-	-
without anti-fatigue agent (rubber stabilized with 0.5% neozone D and 0.5% 1,4-diphenyl-n-phenylenediamine)	138	40	20.5	-	-	85
phenothiazine	138	40	11.2	-	-	145

Card 4/4

TARASOVA, Z. N.; KAPLUNOV, M. Ia.; KOZLOV, T. V.; KLAUZEN, N. A.; DOGADKIN, B.A.

Interaction of sulphur and natural rubber under ionizing radiation.  
Chem prum 11 no.11:601-604 N '61.

1. Vyskumnyy ustav prumyslu pneumatik, Moskva.

L 40564-65 EWG(j)/EWT(m)/EWF(j)/EWA(h)/EWA(1) Pc-4/Feb GS/EM  
 S/0000/64/000/000/0088/0094  
 ACCESSION NR: AT5004098

20  
 B+1

AUTHOR: Snisarenko, A.M.; Tarasova, Z.N.

TITLE: A study of physico-chemical changes in structure during wear of vulcanized rubber

SOURCE: Nauchno-tekhnicheskoye soveshchaniye po friktsionnomu iznosu rezin. Moscow, 1961. Friktzionnyy iznos rezin (Frictional wear of rubber); sbornik statoy. Moscow, Izd-vo Khimiya, 1964, 88-94

TOPIC TAGS: natural rubber, vulcanized rubber, rubber wear, rubber structure, frictional wear, vulcanization kinetics, mercaptobenzthiazole, radiation vulcanization, rubber abrasion

ABSTRACT: Experimental methods and a mathematical model were developed which permit the evaluation of the physical and chemical properties of rubber vulcanizates during abrasive wear. The kinetics of the sulfur-natural rubber reaction were studied at 100-130C with sulfur-35 and in the presence or absence of 2-mercaptobenzthiazole. Sulfur-35 was used to study the kinetics of radiation-vulcanized/unfilled natural rubber.

The letter was addressed to  
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ACCESSION NR: AT5004098

of abraded particles was measured in Dogadkin's apparatus to evaluate changes in crosslinking, and radiation measurements indicated the bonding of sulfur and the cleavage of mono- and polysulfide bonds during abrasion. A mathematical model was developed correlating the bonding of sulfur and change in rate constants with temperature. The experimental results indicated that the increase in temperature of the contact zone and abraded layer is markedly higher than assumed by earlier theories and little affected by the normal load during wear. The reaction period is on the order of a few seconds, confirming assumptions of fatigue effects in the abrasive wear of vulcanized rubber. The applied load affects wear by the penetration of abrasive particles into the rubber. Differences in the calculated period of chemical processes on different abrasive surfaces are ascribed to the difference in temperatures reached and to the effects of surface properties. Orig. art. has: 2 figures, 3 tables and 7 formulas.

ASSOCIATION: none

SUBMITTED: 05Aug64

ENCL: 00

SUB CODE: MT

NO REF SOV: 007

OTHER: 014

APPROVED FOR RELEASE: 07/13/2001

CIA-RDP86-00513R001754930008-4"

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AUTHORS: Dogadkin, B. A., Tarasova, Z. N., Fogel'son, M. S., and Kashlinskiy, A. I.

TITLE: Interaction of sulfur with rubber under the action of  $\gamma$ - radiation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 1, 1961, 90 - 93

TEXT: The authors studied the interaction of natural-rubber-sulfur (NR + S) mixtures under the action of  $\gamma$ - radiation (dose 6 - 11 Mr) at +20 and -196°C by means of electron paramagnetic resonance (epr). They used a spectrometer with high-frequency modulation at -140 - +20°C. Highly stable radicals were formed by irradiating NR and its mixtures with 2% S; their spectra were equal, their concentration was  $(1 - 2.5) \cdot 10^{14} \text{ mg}^{-1}$ , and after 30 - 45 days it was still  $(0.05 - 0.1) \cdot 10^{14} \text{ mg}^{-1}$ . Besides free alkyl radicals formed during irradiation of NR due to the disruption of an H atom and the rupture of

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the -C-C bonds of the NR chains, radicals of the allyl type are also formed. They are stabilized by the effect of conjugation of the free valency with the adjacent double bond and are assumed to be long-lived polymer radicals. When irradiated at  $-196^{\circ}\text{C}$ , the NR spectrum differs from that of the S + NR mixture. Since each spectrum constitutes a superposition of lines, the existence of several radical types is assumed. The inhibitory effect of sulfur may be ascribed, as in benzene, to the delocalization of an electron in the eight-membered ring of the sulfur molecule. When the samples irradiated at  $-196^{\circ}\text{C}$  are heated at room temperature for 1 - 1.5 min, their spectrum becomes equal to that of long-lived radicals formed by irradiation of the same samples at  $+20^{\circ}\text{C}$ . Thus, radicals of varying stability are formed by irradiation at  $-196^{\circ}\text{C}$ . The short-lived among them live for a few seconds at room temperature. The concentration dropped by gradual heating of the samples (at intervals of  $6-7^{\circ}\text{C}$ ) from  $-196$  to  $+20^{\circ}\text{C}$  in liquid-nitrogen vapor, and keeping the sample at given temperature for 5 min as well as cooling to  $-140^{\circ}\text{C}$ . On

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heating from  $-196$  to  $-120^{\circ}\text{C}$  the spectrum was not changed. The range of intense destruction of radicals corresponds to the vitrification range of NR (between  $-80$  and  $-50^{\circ}\text{C}$ ). The reactivity rapidly increases in the range of the mobility jump of individual links of the molecular chain. Here (as on heating of irradiated NR) only the initial short-lived radicals perish whereas in the S + NR mixture new short-lived radicals with a high g-factor are also formed. This is explained in two ways: (A) At least two new radicals are formed in the mixture, or (B) only one radical with an anisotropic g-factor containing an -S-S group is formed. Since the concentration of newly formed radicals is a function of heating with a maximum at  $-80^{\circ}\text{C}$ , it is concluded that at this temperature the ratio of the rate of formation to the rate of destruction of the new radicals is most favorable, effecting a maximum of recordable concentration. For the most distinct additional line characterizing the newly formed radicals, the g-factor is  $2.027 \pm 0.003$ . Its value is equal to the one exhibited by sulfur radicals in the melt at  $200^{\circ}\text{C}$ . It is concluded that the new radicals are due to interaction of  $\text{S}_8$  molecules with polymer radicals  $\text{R}^{\bullet}$  of

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NR under the action of  $\gamma$ -rays. Below vitrification temperature, this interaction does not take place. It is based on the rupture of the eight-membered sulfur ring, and can only take place at temperatures permitting the required mobility of NR molecular chains:  $R^\cdot + S_8 \rightarrow RS_8^\cdot$  (1).  $RS_8^\cdot$

may further decompose with separation of sulfur radicals:

$RS_8^\cdot \rightarrow RS_{(8-x)}^\cdot + S_x^{\cdot\cdot}$  (2). Thus, S radicals are formed due to interaction of polymer radicals with S molecules at temperatures below  $0^\circ\text{C}$ . The radicals  $RS_{(8-x)}^\cdot$  live longer than polymeric  $R^\cdot$  radicals whereas  $S_x^{\cdot\cdot}$

radicals are more active. The steric structure of rubber is a consequence of the interaction of  $R^\cdot$  with each other and with rubber molecules. The structure is formed in a temperature range in which, according to the epr, the radicals disappear most quickly when the irradiated NR thaws. S inhibits the formation of polymer radicals during irradiation. The S-containing radicals can be stabilized by formation of cyclic end groups. Also this process reduces the cross links. An interaction of  $S_x^{\cdot\cdot}$  biradicals with molecular chains is possible; nevertheless, intramolecular

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cyclic structures may form which do not increase the number of double bonds. Data of isotopic exchange show that polysulfide linear structures  $S_x (x > 1)$  occur in the vulcanizates. These structures increase the static strength of radiation vulcanizates. There are 4 figures and 3 references: 2 Soviet and 1 non-Soviet. The reference to the English-language publication reads as follows: D. Gardner, G. Fraenkel, J. Am. Chem. Soc., 78, 3279 (1956).

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology imen: M. V. Lomonosov)

PRESENTED: June 14, 1961, by A. A. Balandin, Academician

SUBMITTED: June 8, 1961

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TARASOVA, Z. N.  
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DOJADKIN, B. A., and TARASOVA, Z. N., Moscow  
Institute of Fine Chemical Technology named  
A. V. Leninsky [1961 position] - "Influence  
of vulcanisation structures on physical and  
mechanical properties of vulcanisates"  
(Session II)

KUZYMINSKIY, A. S., LYUECHANSKAYA, L. I.,  
VELIKOYEV, L. S., Scientific Research Institute  
of Rubber Industry, Moscow [1960 location] -  
"Influence of mechanical structures on the aging  
of vulcanisates" (Session II)

MAKAREVICH, A. V., and [1961 position], M. N.,  
[1961 position], A. V., [1961 position], A. V., and  
[1961 position], A. V., Scientific Research Institute  
of Rubber Industry, Moscow [1961 location] -  
"Investigation of aging vulcanisation of  
"KNT-20 fluorocopolymer" (Session II)

MEZHIGORSKIY, M. N., and [1961 position], G. I.,  
Scientific Research Institute of Tire Industry,  
Moscow - "Special features of the mechanism of  
abrasion of high-elastic materials" (Session V)

Report to be submitted for the 4th Rubber Technology Conference,  
London, England, 22-25 May 1962.

S/844/62/000/000/095/129  
D204/D307

AUTHORS: Dogadkin, B. A., ~~Tarazova, Z. N.~~, Kaplunov, M. Ya., Kozlov, V. T., Klauzen, I. A. and Matveyev, V. S.

TITLE: The interactions of sulfur with polymers under the action or irradiation

SOURCE: Trudy II Vsesoyuznogo soveshchaniya po radiatsionnoy khimii. Ed. by L. S. Polak. Moscow, Izd-vo AN SSSR, 1962, 554-562

TEXT: The interactions of S with natural rubber, 1,4-cis-polybutadiene, butadiene-styrene and butyl rubber was studied, under irradiation from a  $Co^{60}$  source. S added on to natural rubber at 25 - 100°C and to butadiene-styrene rubber and polyethylene at 25°C, under argon, in amounts increasing with the dose (0 - 120 Mr), the rate of addition being faster at higher temperatures. At room temperature the amount of S added on is independent of the initial S-content in the starting mixture (1 - 10% by weight). The addition

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